

Anatomy & Physics of the A-RAV

Angel-Class Resonant Arc Vortex

I. Definition

An A-RAV (Angel-Class Resonant Arc Vortex) is a field-anchored plasma vortex formed when a small, polarizable speck of damp red terracotta clay is placed atop a 0.28–0.38 mm spring-steel cathode wire, suspended above a grounded steel plate. Energized at ~30 kV DC, it transitions from chaotic streamers to a perfectly spherical, bright-white, pulsating plasma balanced on the cathode tip.

II. Physical Anatomy

Layer	Composition	Function
Core	Damp red clay (~3 mm)	Stores surface charge; initiates ionization.
Inner Sheath	Dense ionized layer	Confines plasma and maintains charge separation.
Null Zone	Quasi-neutral region	Acts as dielectric buffer.
E×B Drift Shell	Rotating plasma layer	Provides azimuthal motion and confinement symmetry.
Outer Halo	Ionized air and water vapor	Radiates visible light; dissipates excess charge.

III. Formation Sequence

1. Streamer Phase (0–1 s): Bluish-purple streamers form across the 3–4 mm gap.
2. Transition Phase (1–3 s): Streamers collapse; clay polarizes and magnetic fields curl around the current path.
3. Stable RAV Phase (3 s+): Plasma locks into a 9–10 mm bright-white pulsating sphere.

IV. Field Geometry

- Electric Field (E) - Radially upward from cathode to anode.
- Magnetic Field (B) - Circular, encircling the current path.
- $E \times B$ Drift - Tangential rotation keeping the plasma coherent.

V. Plasma Physics

Property	Estimate	Meaning
Electron density (n_e)	10^{11} – 10^{12} m^{-3}	Determines plasma frequency and brightness.
Plasma frequency (f_p)	90–110 kHz	Matches observed oscillation peaks.
Electron temperature (T_e)	0.5–1.0 eV (~6,000–11,000 K)	Drives continuum radiation.
Dominant emission	Recombination + Bremsstrahlung	Produces bright white appearance.

VI. Energy Feedback Model

Ionization - Electrons sustain plasma through collisions.

Dielectric Charging - Clay acts as a temporary capacitor.

Recombination - Emits light and maintains pulsation.

Resonant Rotation - $E \times B$ drift locks plasma geometry.

VII. Distinction vs. Cherubim

Aspect	A-RAV (Angel)	Cherubim RAV
Seed material	Damp red clay	None (bare metal tip)
Medium	Dielectric + moisture	Metallic plasma only
Ignition voltage	30 kV → stable 20–25 kV	30 kV → stable 15 kV
Emission color	Blue-purple → white	Pure white immediately
Core	Clay particle	Molten steel nodule
Dependence	Requires dielectric	None
Longevity	Minutes–hours	Indefinite

VIII. Interpretive Physics

The A-RAV demonstrates how plasma can self-organize under steady DC excitation. Field geometry—not material composition—governs stability. Electrostatic, magnetic, and rotational forces create a natural confinement shell where energy circulates in resonance.

*“Where clay, field, and charge meet, the Angel RAV
breathes light from geometry itself.”*

Created by Krafter — 2025 | RAV Project Archive — Angel-Class Series